

**Retaining Walls Inspection and Test Plan**

Project: Peacocke Whatukooruru Drive

Number and Revision: DS1205 - 104 - Rev F

**SECTION 1 – GENERAL DETAILS**

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| **Project Name:** | Peacocke Whatukooruru Drive | **ITP Number:** | 104 |
| **Project Number:** | DS1205 | **ITP Status:** | Draft For Approval |
| **ITP Description:** | RETAINING WALLS | **Revision:** | F |

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| **Contract Number:** | Peacocke Whatukooruru Drive | **Drawing Sets:** | Drawings 5200 - 5303 |
| **Customer:** | Hamilton City Council | **Specification:** | Project Specification and Appendices. |
| **Quality Specified:** | NZTA Z/1 |

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| **Review / Update History** | | | | | **Verification Activity** | | | |
| **Rev:** | **Status:** | **Date:** | **Reviewed By:** | **Revision Details:** | **Activity Key** | | **Responsibilities Key** | |
| A | Draft for Approval | 3/02/2023 | Nairy Yaghobian | First Revision for Review and Approval | **A** | Action | **ENG** | **Engineer / Engineer's Rep** |
| **B** | Report by Breach | **CR** | **Customer Rep** |
| B | Draft for Approval | 2/03/2023 | Zane Hawken | Incorporate comments from BBO | **C** | Check | **PD** | Project Director |
| **D** | Dimension Inspection | **PM** | Project Manager |
| C | Draft for Approval | 14/03/2023 | Shahil Sharma | Incorporate Hold Points for Geogrid Installation and Proofroll | **E** | Examine | **OP** | Operations Manager |
| **HP** | **Hold Point (Engineer)** | **HSE** | HSE Manager / Rep |
| D | Draft for Approval | 11/05/2023 | Shahil Sharma | Incorporate altered Drainage Design Detail | **H** | Hold Point (Internal) | **QM** | QA Manager / Rep |
| **I** | Inspection | **PE** | Project Engineer |
| E | Draft for Approval | 1/06/2023 | Shahil Sharma | Incorporate comments from BBO | **M** | Monitor on Random Basis | **SE** | Site Engineer |
| **O** | Operation | **QE** | Quality Engineer |
| F | Draft for Approval | 31/07/2024 | Jotham Makini | Incorporate Hold Points for Geogrid Installation on Abutments | **R** | Review | **SUP** | Superintendent / Supervisor |
| **S** | Subcontractor | **SV** | Surveyor |
|  |  |  |  |  | **V** | Visual Verification | **ITP** | Third Party Inspector |
| **W** | Witness Point | **SPEC** | Specialist |

**SECTION 2B – ITP CLOSEOUT**

**SECTION 2A – ITP Approval**

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| **Position** | **Name:** | **Signature:** | **Date:** | **Position** | **Name:** | **Signature:** | **Date:** |
| Downer PM |  |  |  | Downer PM |  |  |  |
| Downer QM |  |  |  | Downer QM |  |  |  |
| Client (If Applicable) |  |  |  | Client (If Applicable) |  |  |  |

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| **Item No.** | **Inspection and Test Point** | **Acceptance / Conformance Criteria** | **Standard / Specification** | **Verifying Document** | **Frequency** | **Verification Activity** | |
| **Activity** | **By** |
| **SECTION 3 – PRE-CONSTRUCTION (P&G / ESTABLISHMENT)** | | | | | | | |
| **3.01** Site Requirements | | | | | | | |
| 3.01.01 | Construction Pack | Methodology and ITP to be submitted to the Engineer and approved prior to works beginning | Downer | Construction Pack | Submit 10 days prior to commencement of  works | **HP** | **ENG** |
| 3.01.02 | Survey Setout | Survey Set out as per contract drawings and specification, capturing pre- construction levels where needed. | Downer | Survey Records | Prior to Works | **H** | **SV** |
| 3.01.03 | Service Location | Complete the Excavation permit process to identify, locate and protect all services. | Downer | Excavation Permit | Prior to Excavation | **H** | **SE** |
| 3.01.04 | Internal Permits | Complete internal Permits as required to complete works including but not limited to: Hot works, concrete saw, lift, confined space, working at height etc. | Downer | Internal Permits | Prior to Excavation | **H** | **SE** |
| 3.01.05 | External Permits | Obtain External Permits as required to complete works including but not limited to: Close approach, Worksafe Notice etc. | Downer | External Permits | Prior to Excavation | **H** | **PE** |
| 3.01.06 | Approved Construction Drawings | Prior to starting works, Ensure that the construction drawings are both IFC and the Current Version. | Downer | IFC Drawings | Prior to works start | **H** | **PE** |
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| **SECTION 4 – MATERIAL, PERSONNEL & THIRD PARTY APPROVAL – RETAINING WALLS** | | | | | | | |
| **4.01** Stone Strong retaining walls | | | | | | | |
| 4.01.01 | Stone Strong Block Molds | Stonestrong blocks to be supplied by an approved supplier.  The Contractor shall liaise with the Principal-appointed Cultural Artist to coordinate carving of the supplied blanks and the production of moulds & blocks | PS - 12 | Conforming Molds Post Carving | Before Installation | **H** | **PE** |
| 4.01.02 | MSE retaining wall backfill and drainage Material | Backfill is to comprise a well graded, granular material such as GAP65 or site won Hinuera Sand, which must be free of any deleterious material. Sand backfill shall have a fines content (less than 0.075mm diameter) of no more than 10%.  Drainage metal to be 20/40 drainage aggregate or similar approved by engineer.  Labratory MDD (x2 per material type) at standard compaction | GWS - 5.3.3 | Lab Results | Prior to works | **H** | **PE** |
| 4.01.03 | Geogrid | Geogrid to be Miragrid GX200/30 or similar approved | GWS - 5.3.1 | Datasheet | Before Installation | **H** | **PE** |
| 4.01.04 | Para web | Paraweb to be the correct grade: Paraweb 2D-50 | GWS - 5.3.2 | Datasheet | Before Installation | **H** | **PE** |
| 4.01.05 | Drainage Pipes | Shall be 160mm diameter NZTA F/2 compliant smooth bore perforated corrugated pipe with filter sock | GWS - 5.3.4 | Datasheet | Before Installation | **H** | **PE** |
| 4.01.06 | Geotextile | Shall be Bidim A39 geotextile or similar equivalent | SS - 12 | Datasheet | Before Installation | **H** | **PE** |
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| **SECTION 5 – CONSTRUCTION ACTIVITY – RETAINING WALLS** | | | | | | | |

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| **5.01** Load Transfer Platform | | | | | | | |
| 5.01.01 | Excavation to subgrade | The foundation materials are to comprise natural Hinuera sand material, stiff Hinuera Silt or imported clean sand and must achieve a minimum of 4 blows per 100mm when tested with a Scala penetrometer. Any exposed  silts must have vane shear strengths greater than 70kPa. | GWS - 5.2 | Scala Results | Every 10m | **H** | **SE** |
| 5.01.02 | Foundation Approval | Results of the foundation material testing shall be supplied to the Engineer for approval and the prepared ground shall be inspected by the Engineer. Construction may not proceed until receiving Engineer’s approval. | GWS - 5.2 | Approval | Prior to proceeding. Min 48h notice to Engineer | **HP** | **ENG** |
| 5.01.03 | Undercut subgrade | Any unsuitable materials, such as uncontrolled fill, contaminated materials or any weak or organic materials, shall be undercut and replaced with compacted granular fill (WHAP65 or equivalent) or Hinuera Sand.  Surveyor to capture extent of undercut (if any) to include in asbuilt. | GWS - 5.2 | Survey Record/ Photo record | If required | I | SE |
| 5.01.04 | Undercut backfill compaction | NDM (DT 300mm deep or backscatter with GAP65), with MDD of 95% or greater | GWS - Table 3 | NDM Results | 1 per 500m3  with at least 1 test per 0.5m lift per 20m run of wall | **H** | **SE** |
| 5.01.05 | Geogrid Installation | Geotextiles shall be placed in accordance with the Manufacturer’s instructions and installed as specified on the drawings. A minimum overlap of 500mm is required between sheets. Engineer to inspect 1 layer prior to  backfill. | GWS - 4.1 | Photo record | Each layer - 1 layer per abutment to be inspected | **HP** | **ENG** |
| 5.01.06 | Backfill Installation | All backfill is to be installed in 250mm lifts and compacted to the following standards. | GWS - 5.3.3 | Photo record | Each layer | I | SUP |
| 5.01.07 | Backfill Compaction (NDM) (Gap 65) | NDM (DT 300mm deep or backscatter with GAP65), with MDD of 95% or greater | GWS - Table 3 | NDM Results | 1 per 500m3  with at least 1 test per 0.5m lift per 20m run of wall | **H** | **SE** |
| 5.01.08 | Clegg/Proofroll (Gap 65) | Proofroll of each layer. 4 Cleggs to be undertaken per NDM test. Engineer  to proofroll/inspect final layer of load transfer platform. | GWS - Table 3 | Clegg Result  sheet | Each layer - final layer  to be inspected | **HP** | **ENG** |
| 5.01.09 | Scala Penetrometer (Hinuera Sand) | Minimum average value over 5 tests of 5 blows per 100mm, minimum single value of 4 blows per 100mm | GWS - Table 3 | Scala Results | 1 per 500m3  1 test per 0.5m lift per 20m run of wall | **H** | **SE** |
| **5.02** Stone Strong Wall Construction | | | | | | | |
| 5.02.01 | Level founding platform | The Contractor shall construct a 200 mm thick levelling pad on top of the load transfer platform to create a level founding platform to accept the MSE retaining wall. | PS - 12 | Site Photo / Checksheet | Prior to Stone Strong block installation | I | SUP |
| 5.02.02 | Installation of blocks | Blocks to be installed to the height and location as detailed on the construction drawings. The table below details acceptable tollerances. | GWS - 5.4 | Site Photo / Checksheet | Each layer | I | SUP |

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| 5.02.03 | Paraweb Installation | The correct number of parawebs are to be installed as shown on the construction drawings.  Para web is to be placed flat or with a 1% fall toward the rear of the wall. The Para web must be free of wrinkles and lightly tensioned prior to and during placement of backfill. Shallow trench to be dug toward the end of the paraweb, pin to be used to pull paraweb taught prior to backfilling.  The Para web must be continuous over the design embedment length and no joins are permitted unless adequately lapped and spliced according to the Manufacturer’s instructions.  150mm of fill cover is required before construction equipment can travel over the area | GWS - 5.3.2 | Site Photo / Checksheet | Each layer | I | SUP |
| 5.02.04 | Geotextile | Geotextile to be placed against rear excavated face with a minimum overlap of 400mm between adjacent geotextile strips. Further Geotextile required to separate drainage aggeragate and MSE wall backfill, if sand is used.  Short widths of geotextile to be placed across the internal open join area on the rear face of each Stonestrong block join to contain internal block void hardfill.  Geotextile to be used to block paraweb voids within Stonestrong blocks that are not in use. | SS - 5 | Site Photo | Each Layer | I | SUP |
| 5.02.05 | Drainage Installation | Two x 160mm Drainage pipe wraped in filter sock to be installed along the external perimeter of the Load Transfer Platform.  Drainage aggregate to be placed along external perimeter of Load Transfer Platform for each MSE wall layer backfill, forming a Chimney Drain. Chimney Drain to be a minimum width of 300mm and extend to the base of the Load Transfer Platform.  Internal block void hardfill to be 20/40 drainage aggregate or similar approved by engineer.  Additional Drainage pipe wrapped in 0.75m3/m run of drainage metal only required beneath wall embedment at toe of the outside of the wall if the slope doesn’t grade away from the toe of the wall.  Drainage outlets shall be connected to the reticulated stormwater system or other approved outlet structure at the discretion of the design engineer | SS - 5 | Site Photo / Checksheet | During Installation | I | SUP |
| 5.02.06 | Backfill Installation | All backfill is to be installed in 250mm lifts and compacted to the following standards. | GWS - 5.3.3 | Site Photo / Checksheet | Each layer | I | SUP |
| 5.02.07 | Nuclear Densometer (NDM) (Gap 65) | NDM (DT 300mm deep or backscatter with GAP65), with MDD of 95% or greater | GWS - Table 3 | NDM Results | 1 per 500m3  with at least 1 test per 0.5m lift per 20m run of wall | **H** | **SE** |

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| **Activity** | **By** |
| 5.02.08 | Clegg/Proofroll (Gap 65) | Proofroll of each layer. 4 Cleggs to be undertaken per NDM test. | GWS - Table 3 | Clegg Result sheet | Each layer | **H** | **SE** |
| 5.02.09 | Scala Penetrometer (Hinuera Sand) | Minimum average value over 5 tests of 5 blows per 100mm, minimum single value of 4 blows per 100mm | GWS - Table 3 | Scala Results | 1 per 500m3  1 test per 0.5m lift per 20m run of wall | **H** | **SE** |
| **5.03** Abutment Geogrid Installation | | | | | | | |
| 5.03.01 | Tensar Triaxial 170 | Geotextiles shall be placed in accordance with the Manufacturer’s instructions and installed as specified on the drawings. A minimum overlap of 300mm is required between sheets. Engineer to inspect layer prior to backfill. | GWS - 4.2 | Photo record | Each layer - 1 layer per abutment to be inspected | **HP** | **ENG** |
| 5.03.02 | Tensar Uniaxial RE580 | Geotextiles shall be placed in accordance with the Manufacturer’s instructions and installed as specified on the drawings. No overlapping requirements when connected with Bodkin joints. Engineer to inspect each layer prior to backfill. Grids must be taut prior to backffilling | GWS - 4.2 | Photo record | Each layer - 1 layer per abutment to be inspected | **HP** | **ENG** |
| **5.04** Survey Monitoring | | | | | | | |
| 5.04.01 | Settlement Pins | Settlement pins shall be installed within 24 hours of reaching design subgrade level.  Survey measurements are to be undertaken to within an accuracy of 2mm. Results must be provided to the Engineer within 24 hours of each reading. | GWS - 6.3 | Survey Results (in paper as well as electronic format) | Weekly for the first month, then monthly | R | SV ENG |
| 5.04.02 | Settlement Targets | Targets shall be fixed immediately after completion of the first row of retaining wall blocks at each location and the initial baseline survey reading made prior to the subsequent row of retaining wall blocks placed.  Survey measurements are to be undertaken to within an accuracy of 2mm. Results must be provided to the Engineer within 24 hours of each reading. | GWS - 6.4 | Survey Results (in paper as well as electronic format) | Weekly for the first month, then monthly | R | SV ENG |
| 5.04.03 | Engineers Approval | Geotechnical engineer assesment required before commencement of Pavement construction | BBO | Written approval | Prior to pavement construction | **HP** | **ENG** |
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| **SECTION 6 – POST CONSTRUCTION (FINAL INSPECTION AND HANDOVER)** | | | | | | | |
| **6.01** General | | | | | | | |

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| 6.01.02 | Draft As-Builts | Draft as-builts completed on the completion of MSE wall including red pen mark up to IFC drawing changes.  The draft as-builts shall be provided on a continual basis throughout the project for verification by the Engineer, and as a minimum shall be provided in electronic form prior to application for Practical Completion. | PS 2.2.17 | Draft As-Builts Drawings | Prior to PC | **H** | **SV / PE** |
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